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REMARKS

Claims 1-22 were pending in the present Application. Claim 22 has been withdrawn owing to a species election, leaving Claims 1-21 for consideration upon entry of the present Amendment. No new matter has been introduced by way of amendment.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

First Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1-5, 8, 10-14, 17, 19, 20, and 21 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 2,856,179 to Hogan (hereinafter "Hogan") in view of U.S. Patent No. 5,992,582 to Lou et al. (hereinafter, "Lou"), and further in view of U.S. Patent No. 6,394,239 to Carlson (hereinafter "Carlson"). Applicants respectfully traverse this rejection.

Independent Claim 1 is directed to a screw-type magnetorheological damper, comprising a thrust shaft comprising an external threaded surface in threaded communication with a sealed housing, wherein at least one end of the thrust shaft extends from the housing; at least one rotor disposed in the housing comprising a planar surface with a centrally located aperture, wherein the at least one rotor is in direct contact and rotatably engaged with the threaded surface of the thrust shaft; at least one stator spaced apart from and adjacent to the at least one rotor, wherein the at least one stator is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the at least one rotor; a magnetorheological fluid disposed in a space defined by the at least one rotor and the at least one stator; and means for applying a substantially perpendicular magnetic field to the magnetorheological fluid relative to the planar surface of the at least one stator.

Independent Claim 12 is directed to a screw-type magnetorheological damper, comprising a thrust shaft comprising an external threaded surface in threaded communication with a sealed housing, wherein at least one end of the thrust shaft extends from the housing; a plurality of rotors

and stators alternatingly arranged in the housing, wherein each of the plurality of rotors comprise a planar surface with a centrally located aperture, wherein each of the plurality of rotors is in direct contact with and rotatably engaged with the threaded surface of the thrust shaft, wherein each of the plurality of stators is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the plurality of rotors, and wherein alternating stators comprise a permanent magnet or an electromagnet; and a magnetorheological fluid disposed in a space defined by the plurality of rotors and stators.

Independent Claim 21 is directed to a process for operating a screw-type magnetorheological damper for variably converting a linear force to a rotary force, comprising axially applying a force to a thrust shaft of a screw-type magnetorheological damper, wherein the screw-type magnetorheological damper comprises the thrust shaft having an external threaded surface in threaded communication with a sealed housing, at least one rotor disposed in the sealed housing comprising a planar surface with a centrally located aperture, wherein the at least one rotor is in direct contact and rotatably engaged with the threaded surface of the thrust shaft, at least one stator spaced apart from and adjacent to the at least one rotor, wherein the at least one stator is fixedly attached to the housing and comprises a centrally located aperture dimensioned to accommodate vertical movement of the thrust shaft and a planar surface substantially parallel to the planar surface of the at least one rotor, and a magnetorheological fluid disposed in a space defined by the at least one rotor and the at least one stator; and variably applying a substantially perpendicular magnetic field to the magnetorheological fluid relative to the planar surface of the at least one stator so as to variably covert the linear force applied to the thrust shaft into the rotary force.

Hogan is generally directed to shock absorbers adapted for use in aircraft installations.

Lou is generally directed to rotary damping devices that utilize electrorheological fluids and provide electronically controllable damping to various vibrations.

Carlson is generally directed to damping, resistance control, and motion controlling devices based on magnetorheological fluids.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires, in part, that all elements of the invention be disclosed in the prior art. *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants reiterate their contention that a *prima facie* case of obviousness has not been established because the cited references fail to teach or suggest all elements of Applicants' independent Claims 1, 12, and 21. In particular, at least two features of each of these independent claims have not been mentioned or suggested by the cited references. First, there is no mention of at least one rotor or a plurality of rotors, each of which are "*in direct contact and rotatably engaged with the threaded surface of the thrust shaft*". In addition, there is no mention or suggestion of "*a thrust shaft comprising an external threaded surface in threaded communication with a sealed housing*".

In making the rejection, the Examiner has cited the embodiment represented by Figure 5 of Hogan as being the most relevant. The Examiner's attention is kindly directed to the text of Hogan regarding the absorber of Figure 5, the relevant portion of which has been reproduced for convenience as shown below.

> Another form of this invention is shown in Figure 5 wherein the viscosity of a liquid, preferably oil, is utilized to resist the movement of the shock absorber.
>
> Here again a housing 70 is provided with a cavity into which a plunger 71 projects. The plunger 71 is provided with a grooved screw portion 72 having a helical groove 73 which cooperates with annular grooves 74 in a nut assembly 76 to define the usual ball cavities in which balls 77 are positioned. **Here again a cage 78 is utilized to properly position the balls at the intersection of the grooves 73 and 74.** Antifriction thrust bearings 79 axially locate the nut assembly 76 within the housing 70 without restraining the nut against rotation relative thereto. **Fluid seals 31 engage the plunger 71 on either side of the screw portion 72 and in cooperation with the housing 70 retain oil in the area of the screw and nut.** The nut assembly 76 is provided with a series of radially

> extending fins 82 interspaced with a similar series of radially extending fins 83 mounted on the housing 70. As the nut assembly 76 is rotated relative to the housing 70, the fins 82 rotate with the nut relative to the fins 83 which are fixed on the housing and provide a large surface subject to the viscous resistance of the oil within the cavity.
>
> (Hogan; Column 4, line 74 through Column 5, line 21; emphasis added)

As stated in the text, and illustrated in Figure 5 of Hogan, there is a cage positioned in between the nut assembly and the threaded surface of the shaft. This cage can be seen better in Figure 2 of Hogan. In describing Figure 2, Hogan states, in Column 2 starting at line 69: "A cylindrical cage 30, positioned between the nut 28 and the screw portion 25, is formed with apertures adapted to 3 receive and properly position the balls at these intersections of the grooves 26 and 27 as the nut rotates relative to the screw." In view of the foregoing, Hogan fails to disclose or suggest a rotor that is in direct contact with the threaded surface of the thrust shaft.

In addition, Hogan states and shows that the shaft and the housing are not in threaded communication. The portion of the shaft of Hogan that is communication with the housing is not threaded. Only the portion of the shaft that remains inside of the housing is threaded. Thus, the shaft and housing cannot be in threaded communication as instantly claimed. Moreover, upon carefully studying the remainder of the Specification and Figures of Hogan, Applicants note that Hogan as a whole fails to disclose or suggest Applicants' thrust shaft comprising an external threaded surface that is in threaded communication with a sealed housing. The Examiner now acknowledges this fact in the current Office Action on Page 3, wherein he states: "Hogan lacks using a magnetorheological fluid an externally threaded shaft "in communication" with a sealed housing."

Turning now to Lou, Applicants contend that Lou also fails to disclose or suggest 1) at last one rotor or a plurality of rotor, each of which are in direct contact and rotatably engaged with the threaded surface of the thrust shaft, and 2) a thrust shaft comprising an external threaded surface that is in threaded communication with a sealed housing.

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In a previous response (dated March 28, 2005) to an Office Action (dated January 27, 2005), Applicants addressed Lou's failure to disclose or suggest at last one rotor or a plurality of rotor, each of which are in direct contact and rotatably engaged with the threaded surface of the thrust shaft. In addition, the Examiner has acknowledged, on Pages 3 and 6 of the same Office Action (dated January 27, 2005), that the rotor electrodes are connected indirectly to the housing.

With respect to Applicants' claimed thrust shaft comprising an external threaded surface that is in threaded communication with a sealed housing, the Examiner states that Lou discloses a screw type damper including a thrust shaft 41 having a screw nut mechanism in threaded communication with a sealed housing, which has been interpreted to be represented by 29. The portion of Lou that is cited by the Examiner has been reproduced for convenience as shown below.

> **The rotary motion of the rotor 26 of the ER damper 3 is converted from the translational motion of a shaft 41 by a screw-nut mechanism 11** (an efficient version of it can be a ball screw-nut mechanism). The shaft 41 and the stator 29 undergo a translational motion relative to each other but no or little, if any, rotation.
>
> (Lou, Column 4, lines 36-41, emphasis added)

As stated by Lou, there is a screw-nut mechanism between the *rotor* and the *shaft*. There is no discussion in the Specification, nor any indication in the Figures of the *shaft* itself being in *threaded communication* with the sealed *housing*. Threaded communication between the shaft and the rotor is NOT the same thing as threaded communication between the shaft and the housing. Accordingly, like Hogan, Lou fails to disclose or suggest Applicants' claimed thrust shaft comprising an external threaded surface that is in threaded communication with a sealed housing.

Carlson fails to compensate for the deficiencies of Hogan and Lou. Notably absent from Carlson is any mention or suggestion of a screw-type damper. Instead, Carlson is simply relied upon in the Office Action to establish that magnetorheological fluids can substitute for the

electrorheological fluids as disclosed by Lou. Thus, the combination of Hogan, Lou, and Carlson still does not teach or suggest all elements of Applicants independent Claims 1, 12, and 21.

Accordingly, Applicants respectfully request withdrawal of the rejection to independent Claims 1, 12, and 21. Given that Claims 2-5, 8, 10, 11, 13, 14, 17, 19, and 20 depend from, and include all the limitation of, their respective base claims, they too are patentable.

Second Claim Rejection Under 35 U.S.C. § 103(a)

Claims 6, 7, 9, 15, 16, and 18 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Hogan in view of Lou and Carlson as applied to Claims 1 and 12 in the First Claim Rejection Under 35 U.S.C. § 103(a) above, and further in view of U.S. Patent No. 5,900,184 to Weiss et al. (hereinafter "Weiss"). Applicants respectfully traverse this rejection.

Hogan, Lou, and Carlson are discussed above.

Weiss is generally directed to magnetorheological fluid formulations.

Applicants assert that a *prima facie* case of obviousness has not been established against Applicants independent Claims 1 and 12 because Weiss fails to compensate for the deficiencies of Hogan, Lou, and Carlson because Weiss is directed only to magnetorheological fluid compositions and makes no mention of any of the features in Applicants' claimed devices or methods. Thus, the cited references fail to teach all elements of the claims.

Accordingly, Applicants respectfully request withdrawal of the rejection to Claims 6, 7, 9, 15, 16, and 18.

Third Claim Rejection Under 35 U.S.C. § 103(a)

Claim 22 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,279,701 to Namuduri et al. (hereinafter "Namuduri") in view of U.S. Patent No. 6,471,018 to Gordaninejad et al. (hereinafter "Gordaninejad").

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Applicants respectfully request this rejection be withdrawn or held in abeyance, because Claim 22 has been withdrawn from further prosecution on its merits as being drawn to a non-elected invention.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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